Chapter 03

Quadratic Equation

RANKER'S STUFF

SINGLE CORRECT QUESTIONS

Q.1 If roots of the equation $x^2(1 + m^2) + 2mcx + c^2 - a^2 = 0$ are equal, then value of c is-

(1) $a\sqrt{(1+m^2)}$ (2) $a\sqrt{(1-m^2)}$

(3) $m\sqrt{(1+a^2)}$ (4) $m\sqrt{(1-a^2)}$

Q.2 If the roots of the equation $\frac{x-a}{ax-1} = \frac{x-b}{bx+1}$ are reciprocal to each other, then -

(1) a = 1 (2) b = 2 (3) a = 2b (4) b = 0

Q.3 The equation $x - \frac{2}{x-1} = 1 - \frac{2}{x-1}$ has -

(1) no root (2) one root

(3) two equal root (4) infinitely many roots

Q.4 If x – 2 is a common factor of $x^2 + ax + b$ and $x^2 + cx + d$, then -

(1) $d - b = 2(c - a)$ (2) $b - d = (c - a)$

(3) $4 + 2c + b = 0$ (4) $b - d = 2(c - a)$

Q.5 The roots of $a_1x^2 + b_1x + c_1 = 0$ are reciprocal of the roots of the equation $a_2x^2 + b_2x + c_2 = 0$, if-

(1) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (2) $\frac{b_1}{b_2} = \frac{c_1}{a_2} = \frac{a_1}{c_2}$

(3) $\frac{a_1}{a_2} = \frac{b_1}{c_2} = \frac{c_1}{b_2}$

(4) $a_1 = \frac{1}{a_2}$, $b_1 = \frac{1}{b_2}$, $c_1 = \frac{1}{c_2}$

Q.6 If x is the real, then the value of the expression $\frac{2x^2+4x+1}{x^2+4x+2}$ is -

(1) positive and negative number

(2) only positive number

(3) only negative number

(4) only 1

Q.7 The number of real roots of the equation $|x^2 + 4x + 3| + 2x + 5 = 0$ is-

(1) 2 (2) 3 (3) 4 (4) 1

Q.8 If product of roots of the equation $x^2 - 4mx + 3e^{2\log_e m} - 4 = 0$ is 8, then its roots are real, when m equals-

(1) 1 (2) 2

(3) 2 or –2 (4) –2

Q.9 For what value of c, the roots of quadratic equation $(c-2)x^2 + 2(c-2)x + 2 = 0$ are not real -

(1)]1,2[(2)]2,3[

(3)]3,4[(4)]2,4[

Q.10 For $x^3 + 1 \geq x^2 + x$-

(1) $x \leq 0$ (2) $x \geq 0$

(3) $x \geq -1$ (4) $-1 \leq x \leq 1$

Q.11 If roots of the equation $ax^2 + bx + c = 0$ are $\frac{\alpha}{\alpha-1}$ and $\frac{\alpha+1}{\alpha}$, then $(a + b + c)^2$ equals-

(1) $2b^2 - ac$ (2) $b^2 - ac$

(3) $b^2 - 4ac$ (4) $4b^2 - 2ac$

Q.12 If roots of the equation $2x^2 - (a^2 + 8a + 1)x + a^2 - 4a = 0$ are in opposite sign, then -

(1) $0 < a < 4$ (2) $a > 0$

(3) $a < 8$ (4) $-4 < a < 0$

Q.13 If $\frac{x^2+2x+7}{2x+3} < 6$, $x \in R$, then -

(1) $x > 11$ or $x < \frac{-3}{2}$ (2) $x > 11$ or $x < -1$

(3) $\frac{-3}{2} < x < -1$ (4) $-1 < x < 11$ or $x < \frac{-3}{2}$

Q.14 If roots of the equation $x^2 - bx + c = 0$ are two successive integers, then $b^2 - 4c$ equals -
(1) 1 (2) 2 (3) 3 (4) 4

Q.15 The numbers of real roots of $3^{2x^2-7x+7} = 9$ is-
(1) 0 (2) 2 (3) 1 (4) 4

Q.16 If $a(p + q)^2 + 2apq + c = 0$ and $a(p + r)^2 + 2apr + c = 0$, then qr equals -
(1) $p^2 + c/a$ (2) $p^2 + a/c$
(3) $p^2 + a/b$ (4) $p^2 + b/a$

Q.17 If in the equation $ax^2 + bx + c = 0$, the sum of roots is equal to sum of squares of their reciprocals, then $\frac{b^2}{ac} + \frac{bc}{a^2}$ equals -
(1) 1 (2) −1 (3) 2 (4) −2

Q.18 If real value of x and y satisfies the equation $x^2 + 4y^2 - 8x + 12 = 0$, then -
(1) $0 < y < 1$ (2) $2 < y < 6$
(3) $-1 \le y \le 1$ (4) $-2 < y < 6$

Q.19 If roots of $x^2 - (a - 3)x + a = 0$ are such that both of them is greater than 2, then-
(1) $a \in [7, 9]$ (2) $a \in [9, 10)$
(3) $a \in [9, 7]$ (4) $a \in [9, 12]$

Q.20 The real roots of the equation $x^2 + 5|x| + 4 = 0$ are-
(1) −1, −4 (2) 1, 4
(3) − 4, 4 (4) None of these

Q.21 The product of all the solutions of the equation $(x - 2)^2 - 3|x - 2| + 2 = 0$ is
(1) 0 (2) 2 (3) −4 (4) None

NUMERICAL VALUE TYPE QUESTIONS

Q.22 The sum of all the real roots of the equation $|x - 2|^2 + |x - 2| - 2 = 0$ is................

Q.23 If roots of $x^2 - 10cx - 11d = 0$ are a, b and the roots of $x^2 - 10ax - 11b = 0$ are c, d, then the value of a + b + c + d is equal to (a, b, c, d are different numbers) ....

Q.24 If both roots of equation $4x^2 - 20px + 25p^2 + 15p - 66 = 0$ are greater than 2, then sum of all possible integral values of p is ———

Q.25 Let a is real number then minimum number of real roots of equation $(x^2 + ax + 1)(3x^2 + ax - 3) = 0$ can be ———

Q.26 The number of integer values of λ for which the expression : $2x^3 - 12x + \lambda = 0$ has real roots is ....

Q.27 Let k be an integer and p is a prime number such that the quadratic equation $x^2 + kx + p = 0$ has two distinct positive integer solutions. Then the value of $-(p + k)$ is.

Q.28 Find out number of solution of equation
$\sqrt{x+1} - \sqrt{x-1} = \sqrt{4x-1}$

STATEMENT TYPE QUESTIONS

Each question contains Statement -I and statement-II. Each question has 4 choices (A), (B), (C) and (D) out of which ONLY ONE is correct.

(A) Statement-I is True, Statement-II is True, statement-II is a correct explanation for statement-I
(B) Statement-I is True, statement-II is True, statement-II is NOT a correct explanation for statement-I
(C) Statement-I is True and statement-II is False
(D) Statement-I is False and statement-II is True

Q.29 **Statement-I :** If a, b, c, b, p, q, r $\in$ R and $ax^2 + bx + c \ge 0$, $px^2 + qx + r \ge 0$ for all x then $apx^2 + bqx + cr \ge 0$ for all real x.
Statement-II : $ax^2 + bx + c >$ for all x if $a > 0$, $b^2 - 4ac < 0$.
(1) A (2) B (3) C (4) D

Q.30 **Statement-I :** If $x \in (2, 3)$ then $x^2 - 5x + 6 > 0$
Statement-II : If $\alpha < x < \beta$, $ax^2 + bx + c = 0$ and root have opposite sign $(\alpha < \beta)$
(1) A (2) B (3) C (4) D

Q.31 **Statement-I :** The equation
$\sqrt{x+1} - \sqrt{x-1} = \sqrt{4x-1}$ has no solution.

Statement-II : Equation $\sqrt{x+1} - \sqrt{x-1} = \sqrt{4x-1}$ and equation $2\sqrt{x^2-1} = 1 - 2x$ have no common solution.

(1) A (2) B (3) C (4) D

Q.32 **Statement-I :** The number of solution of equation $x = \sqrt{6+\sqrt{6+\sqrt{6......\infty}}}$ is 1

Statement-II: For imaginary roots of a quadratic equation, D < 0

(1) A (2) B (3) C (4) D

Q.33 **Statement-I :** Let α,β are the roots of equation $f(x) = 3x^2 - 4x + 1 = 0$ then equation whose root's are $2\alpha, 2\beta$ is $3x^2 - 8x + 2 = 0$

Statement-II : To obtain, from the equation f(x) = 0 having root's α and β the equation having root's 2α and 2β it is sufficient to change x by x/2 in f(x) = 0

(1) A (2) B (3) C (4) D

MORE THAN ONE CORRECT TYPE QUESTIONS

Q.34 If the equation $cx^2 + bx - 2a = 0$ has no real roots and $a < \frac{b+c}{2}$, then -

(1) $ac < 0$ (2) $a < 0$

(3) $\frac{c-b}{2} > a$ (4) $\frac{c+2b}{8} > a$

Q.35 Which of the following is correct for the quadratic equation $x^2 + 2(a-1)x + a + 5 = 0$

(1) The equation has positive roots, if $a \in (-5, -1)$

(2) The equation has roots of opposite sign, if $a \in (-\infty, -5)$

(3) The equation has negative roots, if $a \in [4, \infty)$

(4) None of these

Q.36 If equations $(a + 2)x^2 + bx + c = 0$ and $2x^2 + 3x + 4 = 0$ have a common root where $a, b, c \in N$ then-

(1) $b^2 - 4ac < 0$

(2) minimum value of a + b + c is 16

(3) $b^2 < 4ac + 8c$

(4) minimum value of a + b + c is 7

Q.37 The equation $|x + 1|\ |x - 1| = a^2 - 2a - 3$ can have real solutions for x if a belongs to :

(1) $(-\infty, -1] \cup [3, +\infty)$

(2) $[1 - \sqrt{5}, 1 + \sqrt{5}]$

(3) $[1 - \sqrt{5}, -1] \cup [3, 1 + \sqrt{5}]$

(4) None of these

Q.38 The quadratic equation $x^2 - 2x - \lambda = 0, \lambda \neq 0$,

(1) cannot have a real root if $\lambda < -1$

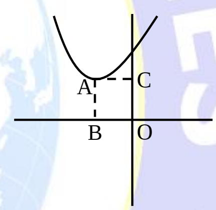
(2) can have a rational root if λ is a perfect square

(3) cannot have an integral root if $n^2 - 1 < \lambda < n^2 + 2n$ where n = 0, 1, 2, 3,...

(4) None of these

COMPREHENSION TYPE QUESTIONS

Q.39 Graph of $f(x) = ax^2 + bx + c$ is shown adjacently for which $\ell(AB) = 2, \ell(AC) = 3$ and $b^2 - 4ac = -4$



(i) The value of a + b + c is equal to

(1) 7 (2) 8 (3) 9 (4) 10

(ii) The quadratic equation with rational coefficients whose one of the root is $b + \sqrt{a+c}$ is

(1) $x^2 - 6x + 2 = 0$ (2) $x^2 - 6x - 1 = 0$

(3) $x^2 + 6x + 2 = 0$ (4) $x^2 + 6x - 1 = 0$

(iii) Range of $g(x) = (a + 1/2)x^2 + (b + 2)x - (c - 1/2)$ when $x \in [-4, 0]$ is

(1) $[-10, -6]$ (2) $\left[\frac{-49}{4}, -10\right]$

(3) $\left[\frac{-49}{4}, -6\right]$ (4 $\left[\frac{-49}{4}, \infty\right)$

Q.40 $f(x) = x^2 + 2(k + 1)x + 9k - 5$

(i) The values of k such that f(x) has real zeroes :

(1) $k \leq 0$ (2) $k \geq 0$

(3) $k \geq 6$ (4) $k \leq 6$

(ii) The values of k such that f(x) has zeroes of opposite signs :

(1) $k < \frac{5}{9}$ (2) $k > \frac{5}{9}$

(3) $k > 1$ (4) None of these

(iii) If $f(x) = (x - k)(x - 10) + 1$ then number of integral values of k for which f(x) has zeroes at integral points -

(1) 1 (2) 2 (3) 3 (4) 4

MATCH THE COLUMN TYPE QUESTIONS

Q.41 If α, β are the roots of the equation $x^2 - 4x + 1 = 0$, then

Column-I	Column–II
(A) $\alpha^2 + \beta^2$	(P) 52
(B) $\alpha^3 + \beta^3$	(Q) 4
(C) $\lvert\alpha - \beta\rvert$	(R) 14
(D) $\frac{1}{\alpha} + \frac{1}{\beta}$	(S) $2\sqrt{3}$

Q.42 Match the following :

	Column – I	Column–II	
(A)	If $x^2 + x - a = 0$ has integral roots and $a \in N$, then a can be equal to	(P)	*2*
(B)	If the equation $ax^2 + 2bx + 4c = 16$ has no real roots and $a + c > b + 4$ then integral value of c can be equal to	(Q)	*6*
(C)	If the equation $x^2 + 2bx + 9b - 14 = 0$ has only negative roots then integral values of b can be	(R)	*12*
		(S)	*20*

ANSWER KEY

RANKER'S STUFF

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	1	4	1	4	2	1	1	2	4	3	3	1	4	1	2
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	1	3	3	2	4	1	4	1210	7	2	57	1	0	4	4
Que.	31	32	33	34	35	36	37	38	39(i)	39(ii)	39(iii)	40(i)	40(ii)	40(iii)	
Ans.	1	2	1	1,2,3,4	1,2,3	2,3	1,3	1,3	4	1	3	3	3	2	

Q.41 [$A \rightarrow R$, $B \rightarrow P$, $C \rightarrow S$, $D \rightarrow Q$]

Q.42 [$A \rightarrow P, Q, R, S$; $B \rightarrow Q, R, S$; $C \rightarrow P, R, S$]